

Remarks

Claims 1-23 are in the application, of which claims 1 and 13 are in independent form.

Claims 1-3, 8, 10-15, 20, 22, and 23 stand rejected under 35 USC Section 102(b) for anticipation by Hiroki, et al. Japanese Publication 11-108610. Claims 4-7 and 16-19 stand rejected under 35 USC Section 103(a) for obviousness over the Hiroki, et al. publication ("Hiroki"). Finally, claims 9 and 21 stand rejected under 35 USC Section 103(a) for obviousness over Hiroki in view of Shiho, et al. Japanese Publication 2002-202238. Because all of the rejections are based on Hiroki, we present the following arguments in support of the patentability of all of the amended claims pending in the application.

Hiroki describes a probe composed of a spin polarization scanning type tunneling microscope (SP-STM). Excitation of the probe with laser beam irradiation generates electrons of spin polarization in the probe. Thus, to practically use the tunneling microscope, the laser beam source is required to excite the probe.

More specifically, with a conventional SP-STM encompassing Hiroki, a laser beam of circular polarization or the like is incident on the probe to excite electrons of spin polarization. In this case, the angular momentum of the circularly polarized laser beam is imparted to the excited electrons so that they align along the direction of the angular momentum. As a result, the excited electrons are spin-polarized (see, Fig. 1). An electric field of sufficient strength applied to the excited electrons with spin polarization causes the excited electrons to be discharged from the probe. A sample to be analyzed is disposed in a position opposite the probe to receive the discharged excited electrons. A tunneling current generated between the probe and the sample indicates the surface condition of the sample. Thus, by measuring the tunneling current, one can detect the surface condition of the sample. (The driving principle of the conventional SP-STM is described in paragraphs [0022] and [0023] in Hiroki.)

In contrast, in the present invention, the inventors discovered that in the probe made of such a material as having zinc-blende crystal structure, carbon and BN, electrons with spin polarization can be generated spontaneously in the forefront of the probe without any exciting means (see, Fig. 2.). To emphasize this distinction, applicants have amended independent claims 1 and 13 to recite that the single crystal solid material has spin polarization in the absence of optical excitation. Since the forefront region with the electrons of spin polarization of the probe is very narrow, the probe can detect the minute

electrons of spin polarization of the probe is very narrow, the probe can detect the minute surface condition of a sample by measuring the tunneling current when the probe is positioned near the sample and the atomic wave function of the probe overlaps the S-wave function of the sample (see, paragraph [0010] of the specification in the present application). In this way the present claimed invention is different from Hiroki in principle and configuration. Applicants submit that their amendments to claims 1 and 13 overcome the anticipation and obviousness rejections and request that they be withdrawn.

Applicants believe their application is in condition for allowance and respectfully request the same.

Respectfully submitted,

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